# (19) World Intellectual Property Organization International Bureau



(43) International Publication Date 8 July 2004 (08.07.2004)

PCT

## (10) International Publication Number WO 2004/056362 A3

- (51) International Patent Classification<sup>7</sup>: A61K 31/415, 31/435, C07D 221/02, 235/02, 471/14, C07F 7/18
- (21) International Application Number:

PCT/EP2003/014554

(22) International Filing Date:

18 December 2003 (18.12.2003)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

02028672.0

20 December 2002 (20.12.2002) EF

- (71) Applicant (for all designated States except US): ALTANA PHARMA AG [DE/DE]; Byk-Gulden-Str. 2, 78467 Konstanz (DE).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): KOEK, Jan [NL/NL]; Schoolstraat 16, NL-9771 BK SAUWERD (NL). KOHL, Bernhard [DE/DE]; Zum Brühl 9, 78465 Konstanz (DE). SENN-BILFINGER, Jörg [DE/DE]; Säntisstrasse 7, 78464 Konstanz (DE). VRIES, Ton [NL/NL]; Troelstralaan 56, NL-9722 JM GRONINGEN (NL).
- (74) Agent: WOLF, Ulrich; c/o ALTANA Pharma AG, Byk-Gulden-Str.2, 78467 Konstanz (DE).

- (81) Designated States (national): AE, AL, AU, BA, BR, CA, CN, CO, DZ, EC, EG, GE, HR, ID, IL, IN, IS, JP, KR, LT, LV, MA, MK, MX, NO, NZ, PH, PL, SG, TN, UA, US, VN, YU, ZA, ZW.
- (84) Designated States (regional): Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR).

### Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AL, AU, BA, BR, CA, CN, CO, DZ, EC, EG, GE, HR, ID, IL, IN, IS, JP, KR, LT, LV, MA, MK, MX, NO, NZ, PH, PL, SG, TN, UA, VN, YU, ZA, ZW, Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR)
- of inventorship (Rule 4.17(iv)) for US only

#### Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments
- (88) Date of publication of the international search report: 2 September 2004

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: 8-TRIALKYSYLOXY-2-METHYL-9-PHENYL-7-0 XO-7,8,9,10- TETRAHYDROIMIDAZO '1,2-H! '1,7! NAPH-THYRIDINES

(57) Abstract: Compounds of the formula (1), in which R1 is hydrogen, methyl or hydroxymethyl, R2a and R2b are both hydrogen or together denote a bond, R3 is 1-7C-alkyl, R4 is 1-7-alkyl and R5 is 1-7C-alkyl, and its salts, are valuable intermediates for preparing active compounds for the prevention and treatment of gastrointestinal diseases.



Intermional Application No PCTTEP 03/14554

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61K31/415 A61K31/435

C07F7/18

C07D221/02

C07D235/02

CO7D471/14

According to International Patent Classification (IPC) or to both national classification and IPC

### B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols) IPC 7 A61K C07D C07F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, CHEM ABS Data, PAJ

0-4	On-N-	
Category °	Citation of document, with Indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	WO 2003/091253 A (ALTANA PHARMA AG, GERMANY) 6 November 2003 (2003-11-06) page 24 -page 25 page 39; example II	1-8
X	WO 02/34749 A (BYK GULDEN LOMBERG CHEMISCHE FABRIK GMBH) 2 May 2002 (2002-05-02) page 43, scheme 3 page 50, example 10 page 57, example H page 58, example D claim 1, definitions of R5a, R5b and R51 RNs 419565-82-5, 419566-17-9 page 45, paragraph 2  -/	1-8

X Further documents are listed in the continuation of box C.	χ Patent family members are listed in annex.				
Special categories of cited documents :					
*A' document defining the general state of the art which is not considered to be of particular relevance  *E' earlier document but published on or after the international filling date  *L' document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)  *O' document referring to an oral disclosure, use, exhibition or other means  *P' document published prior to the international filing date but later than the priority date claimed	<ul> <li>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</li> <li>"X" document of particular relevance; the claimed invention cannot be considered no involve an inventive step when the document is taken alone</li> <li>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</li> <li>"&amp;" document member of the same patent family</li> </ul>				
Date of the actual completion of the international search	Date of mailing of the international search report				
11 May 2004	20/07/2004				
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentiaan 2	Authorized officer				
NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Elliott, A				



Inc. Jonal Application No
PCT P 03/14554

ation) DOCUMENTS CONSIDERED TO BE RELEVANT	PCIPER O	<del></del>
Citation of document, with indication, where appropriate, of the relevant passages	<del></del>	Relevant to claim No.
WO 01/72757 A (BYK GULDEN LOMBERG CHEMISCHE FABRIK GMBH) 4 October 2001 (2001-10-04) RNs 363599-17-1, 363599-18-2 page 12, line 2 - line 4; examples 12-14	-	1-8
WO 01/72756 A (BYK GULDEN LOMBERG CHEMISCHE FABRIK GMBH) 4 October 2001 (2001-10-04) cited in the application claim 1, definitions of R5a, R5b and R5' page 22		1-8
WO 01/72754 A (BYK GULDEN LOMBERG CHEMISCHE FABRIK GMBH) 4 October 2001 (2001–10–04) claim 1, definition of R5a, R5b and R5' page 26		1-8
WO 00/17200 A (BYK GULDEN LOMBERG CHEMISCHE FABRIK GMBH) 30 March 2000 (2000-03-30) the whole document		1-8
WO 98/42707 A (BYK GULDEN LOMBERG CHEMISCHE FABRIK GMBH) 1 October 1998 (1998-10-01) cited in the application the whole document		1-8
WO 01/72748 A (BYK GULDEN LOMBERG CHEMISCHE FABRIK GMBH) 4 October 2001 (2001-10-04) cited in the application the whole document		6
	WO 01/72757 A (BYK GULDEN LOMBERG CHEMISCHE FABRIK GMBH) 4 October 2001 (2001-10-04) RNs 363599-17-1, 363599-18-2 page 12, line 2 - line 4; examples 12-14  WO 01/72756 A (BYK GULDEN LOMBERG CHEMISCHE FABRIK GMBH) 4 October 2001 (2001-10-04) cited in the application claim 1, definitions of R5a, R5b and R5' page 22  WO 01/72754 A (BYK GULDEN LOMBERG CHEMISCHE FABRIK GMBH) 4 October 2001 (2001-10-04) claim 1, definition of R5a, R5b and R5' page 26  WO 00/17200 A (BYK GULDEN LOMBERG CHEMISCHE FABRIK GMBH) 30 March 2000 (2000-03-30) the whole document  WO 98/42707 A (BYK GULDEN LOMBERG CHEMISCHE FABRIK GMBH) 1 October 1998 (1998-10-01) cited in the application the whole document  WO 01/72748 A (BYK GULDEN LOMBERG CHEMISCHE FABRIK GMBH) 4 October 2001 (2001-10-04) cited in the application	Citation of document, with indication, where appropriate, of the relevant passages  WO 01/72757 A (BYK GULDEN LOMBERG CHEMISCHE FABRIK GMBH) 4 October 2001 (2001-10-04) RNs 363599-17-1, 363599-18-2 page 12, line 2 - line 4; examples 12-14  WO 01/72756 A (BYK GULDEN LOMBERG CHEMISCHE FABRIK GMBH) 4 October 2001 (2001-10-04) cited in the application claim 1, definitions of R5a, R5b and R5' page 22  WO 01/72754 A (BYK GULDEN LOMBERG CHEMISCHE FABRIK GMBH) 4 October 2001 (2001-10-04) claim 1, definition of R5a, R5b and R5' page 26  WO 00/17200 A (BYK GULDEN LOMBERG CHEMISCHE FABRIK GMBH) 30 March 2000 (2000-03-30) the whole document  WO 98/42707 A (BYK GULDEN LOMBERG CHEMISCHE FABRIK GMBH) 1 October 1998 (1998-10-01) cited in the application the whole document  WO 01/72748 A (BYK GULDEN LOMBERG CHEMISCHE FABRIK GMBH) 4 October 2001 (2001-10-04) cited in the application



International Application No PCTyEP 03/14554

5-1					03/14554
Patent document cited in search report		Publication date		Patent family member(s)	Publication date
WO 2003091253	A	06-11-2003	WO	03091253 A1	06-11-2003
WO 0234749	A	02-05-2002	AU BR CA WO	1056302 A 0114873 A 2426616 A1 0234749 A1	06-05-2002 01-07-2003 02-05-2002 02-05-2002
	·		EP HU NO SK	1332143 A1 0302308 A2 20031830 A 5072003 A3	06-08-2003 28-11-2003 24-04-2003 11-09-2003
WO 0172757	A	04-10-2001	AU BR CA CN WO EP JP	5475601 A 0109512 A 2404477 A1 1420890 T 0172757 A1 1303519 A1 2003528879 T	08-10-2001 17-12-2002 04-10-2001 28-05-2003 04-10-2001 23-04-2003 30-09-2003
			US	2003139412 A1	24-07-2003
WO 0172756	A A	04-10-2001  04-10-2001	AU BR CN CZ WO EP HU JP NSK US BR CA	6016601 A 0109483 A 2404474 A1 1426414 T 20023194 A3 0172756 A1 1313740 A1 0302331 A2 2003528878 T 20024662 A 13852002 A3 2003125327 A1 4422501 A 0109542 A 2404460 A1	08-10-2001 10-06-2003 04-10-2001 25-06-2003 15-01-2003 04-10-2001 28-05-2003 29-12-2003 30-09-2003 27-09-2002 04-02-2003 03-07-2003 
			CN CZ WO EP HU JP NO SK US ZA	1422274 T 20023116 A3 0172754 A1 1313739 A1 0300578 A2 2003528876 T 20024597 A 13872002 A3 2003158193 A1 200207636 A	04-06-2003 15-01-2003 04-10-2001 28-05-2003 28-07-2003 30-09-2003 25-09-2002 04-02-2003 21-08-2003
WO 0017200	A	30-03-2000	AT AU BG BR CA CN CZ DE DE DK	231862 T 763463 B2 6192099 A 105270 A 9914044 A 2344251 A1 1319101 T 20011082 A3 69905178 D1 69905178 T2 1115725 T3	15-02-2003 24-07-2003 10-04-2000 30-11-2001 04-12-2001 30-03-2000 24-10-2001 12-09-2001 06-03-2003 17-07-2003 23-06-2003

<del></del>						
Patent documer cited in search re		Publication date		Patent family member(s)		Publication date
WO 0017200	Α		EE	200100172	Δ	17-06-2002
			WO	0017200		30-03-2000
			ĒΡ	1115725		18-07-2001
			ES	2191464		01-09-2003
			HK	1038360	λ Δ1	16-05-2003
			HR	20010224	Δ1	30-04-2002
			HÜ	0102990		28-01-2002
			ID	28896		12-07-2001
			JP	2002526499	T	20-08-2002
			NO	20011243	À	12-03-2002
			NZ	510610		25-07-2003
			PL	346617		25-02-2002
			PT	1115725		30-06-2003
			SI	1115725		30-06-2003
			SK	3992001		03-12-2001
			TR	200100805		21-08-2001
			ÜS	2002169320		14-11-2002
			ÜS	6436953		20-08-2002
			ZA	200102107		02-05-2002
WO 9842707	Α	01-10-1998	AU	740578	B2	08-11-2001
			ΑU	7520898		20-10-1998
			BG	64157		27-02-2004
			BG	103696	Ā	30-06-2000
			BR	9807883		22-02-2000
			CA	2284747		01-10-1998
			CN	1251102	T	19-04-2000
			CZ	9903397	A3	12-04-2000
			EΑ	2402	B1	25-04-2002
			EE	9900450	Α	17-04-2000
			WO	9842707		01-10-1998
			EP	0971922		19-01-2000
			HR	980147		28-02-1999
			HU	0001555		28-11-2000
			ID	22718	A	09-12-1999
			JP	2001518098		09-10-2001
			NO	994584		23-11-1999
			NZ	337325		29-06-2001
			PL	335699		08-05-2000
			SK	129799		16-05-2000
			TR	9902257		21-12-1999
			US 	6197783	B1	06-03-2001
WO 0172748	Α	04-10-2001	AU	4422601		08-10-2001
			CA	2404455		04-10-2001
			MO	0172748		04-10-2001
			EP	1286993		05-03-2003
			JP	2003528875		30-09-2003
			US	2003153565		00 00 2000